

In the Claims

Claims pending in the application are as follows:

1 1. (Previously Amended) A method of removing contaminant particles from an
2 article surface comprising the steps of:
3 providing at least two fluids of differing densities such that a fluid interface exists
4 between each fluid;
5 providing an article with one or more contaminant particles on a surface of the article
6 having a greater affinity or solubility to one of the at least two fluids;
7 positioning the article into one of the at least two fluids; and
8 removing one or more of the contaminant particles on the article surface by passing
9 the article through at least one fluid interface vertically, horizontally, or at any
10 other orientation.

1 2. (Previously Amended) The method of claim 1 wherein in the step of providing an
2 article with a contaminant particle on the surface of the article having a greater affinity or
3 solubility to one of the at least two fluids, the one of the at least two fluids having a
4 greater affinity or solubility to the contaminant particle has a higher density than another
5 of the at least two fluids.

1 3. (Previously Amended) The method of claim 2 wherein the step of providing at
2 least two fluids of differing densities comprises providing water and chloroform such that

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3 the contaminant particle will remain in the water when the article is passed through the
4 fluid interface into the chloroform and further including the step of removing the water
5 prior to removing the article.

1 4. (Previously Amended) The method of claim 1 wherein in the step of providing an
2 article with a contaminant particle on a surface of the article having a greater affinity or
3 solubility to one of the at least two fluids, the one of the at least two fluids having a
4 greater affinity or solubility to the contaminant particle has a lower density than the other
5 of the at least two fluids.

1 5. (Previously Amended) The method of claim 4 wherein the step of providing at
2 least two fluids of differing densities comprises providing water and ether such that the
3 contaminant particle will remain in the water when the article is passed through the fluid
4 interface.

1 6. (original) The method of claim 1 wherein the step of providing at least two fluids
2 of differing densities includes providing a pressurized gas.

1 7. (Previously Amended) The method of claim 1 wherein the step of removing the
2 contaminant particle comprises etching the contaminant particle on the article surface by
3 positioning the article in the fluid having a greater affinity or solubility for the
4 contaminant particle, such fluid being denser than another of the at least two fluids.

1 8. (Previously Amended) The method of claim 1 further including the step of
2 terminating the removing step by extracting the article through the fluid interface into
3 another of the at least two fluids having substantially no affinity to the contaminant
4 particle.

1 9. (Previously Amended) The method of claim 1 further including the step of
2 terminating the removing step by removing one of the at least two fluids having
3 substantially no affinity to the contaminant particle.

1 10. (Previously Amended) The method of claim 1 wherein in the step of providing an
2 article with a contaminant particle, the contaminant particle having a greater affinity or
3 solubility to a fluid having a higher density than another of the at least two fluids, and
4 wherein the step of positioning the article into the at least two fluids comprises
5 positioning the article into the at least two fluids with agitation or energy input which is
6 periodic in time, or any combination thereof and further including the step of ceasing the
7 agitation and passing the article through the fluid interface.

1 11. (Previously Amended) The method of claim 1 wherein the fluids are mixed at an
2 elevated temperature and further including the steps of ceasing the mixing at an elevated
3 temperature and cooling the fluids such that the fluid having a higher density with an

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4 affinity for the contaminant particle settles and passing the article through the fluid
5 interface.

1 12. (Previously Amended) A method of removing a contaminant particle from a
2 workpiece surface comprising the steps of:

3 providing a reaction vessel having a first inlet/outlet means located at a bottom of the

4 vessel and a second inlet/outlet means located above the first outlet means;

5 providing a first fluid into the reaction vessel;

6 providing at least one other fluid into the reaction vessel, the at least one other fluid

7 having a higher density than the first fluid such that a fluid interface exists between

8 the first fluid and the at least one other fluid;

9 providing a workpiece having a surface contaminant particle having a greater affinity

10 or solubility to either the first fluid or the at least one other fluid;

11 submerging the workpiece into the reaction vessel having the first fluid and the at least

12 one other fluid such that the workpiece is below the fluid interface;

13 removing the surface contaminant particle by passing the workpiece through the fluid

14 interface; and

15 terminating the removing step.

1 13. (original) The method of claim 12 further including the step of providing another
2 fluid into the reaction vessel having a different density than either the first fluid or the at
3 least one other fluid.

1 14. (Previously Amended) The method of claim 12 wherein the step of providing a
2 workpiece having a surface contaminant particle comprises providing a workpiece having
3 a surface contaminant particle having a greater affinity or solubility to the first fluid and
4 the step of submerging the workpiece into the reaction vessel comprises positioning the
5 workpiece in the at least one other fluid layer such that during the step of removing the
6 surface contaminant particle, the surface contaminant particle remains in the first fluid
7 layer.

1 15. (Previously Amended) The method of claim 12 wherein the step of providing a
2 workpiece having a surface contaminant particle comprises providing a workpiece having
3 a surface contaminant particle having a greater affinity or solubility to the at least one
4 other fluid and the step of removing the surface contaminant particle comprises passing
5 the workpiece through the fluid interface into the at least one other fluid layer such that
6 the surface contaminant particle is removed with the at least one other fluid layer.

1 16. (Previously Amended) The method of claim 15 wherein the removing step
2 comprises lifting the workpiece through the fluid interface into the first fluid which has
3 substantially no affinity for the surface contaminant particle.

1 17. (Previously Amended) The method of claim 12 further including the step of
2 heating the first fluid and at least one other fluid into solution after submerging the

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3 workpiece into the reaction vessel such that upon cooling, the first fluid and the at least
4 one other fluid are immiscible with the fluid interface present and the workpiece is
5 substantially present in only one of the fluids.

1 18. (Previously Amended) The method of claim 12 further including the step of
2 agitating the first fluid and the at least one other fluid after submerging the workpiece into
3 the reaction vessel such that upon ceasing agitation, the first fluid and the at least one
4 other fluid are immiscible with the fluid interface present and the surface contaminant
5 particle is present in only one of the fluids.

1 19. (Canceled)

1 20. (Previously Amended) The method of claim 12 wherein the step of removing the
2 surface contaminant particle comprises etching the surface contaminant particle from a
3 surface of the workpiece and wherein the step of terminating the removing step by
4 passing the workpiece through the fluid interface comprises a rapid etch stop.

1 21. (Previously Amended) The method of claim 13 wherein the step of terminating the
2 removing step comprises removing the first fluid from the reaction vessel.

1 22. (original) The method of claim 12 wherein the steps of providing a first fluid or the
2 at least one other fluid comprises providing a pressurized gas.

1 23. (Previously Amended) A method of removing contaminant particles from a
2 workpiece surface comprising the steps of:

3 providing a reaction vessel containing water;

4 providing at least one fluid having a different density than the water such that
5 predominant fluid layers and a water layer exists with a fluid interface between
6 each fluid layer and the water layer;

7 providing a workpiece having surface contaminant particles;

8 passing the workpiece through the at least one fluid interface; and

9 removing the contaminant particles from the workpiece surface as the contaminant
10 particles remain in the water layer.

1 24. (Previously Amended) The method of claim 23 further including the step of
2 removing the water layer from the reaction vessel when the step of removing the
3 contaminant particles is completed if the workpiece is positioned below the water layer.

1 25. (Currently Amended) A method of ~~removing a surface contaminant particle from a~~
2 ~~workpiece surface~~ etching a layer from a surface of a wafer comprising the steps of:

3 providing an etchant fluid;

4 providing at least one fluid immiscible with the etchant fluid having a different density
5 than the etchant fluid and forming a fluid interface therebetween;

6 positioning a ~~workpiece-wafer~~ in the etchant fluid to facilitate etching of a surface
7 ~~contaminant-particle~~layer on the ~~workpiece~~wafer; and
8 terminating etching of the ~~surface-contaminant-particle~~wafer when the ~~workpiece~~
9 ~~wafer~~ is passed through the fluid interface into the at least one fluid immiscible
10 with the etchant fluid.

1 26. (Previously Amended) The method of claim 25 wherein the step of providing at
2 least one fluid immiscible with the etchant fluid comprises providing two fluids
3 immiscible with the etchant fluid, both fluids having a lower density than the etchant fluid
4 and immiscible with each other such that a first fluid interface exists between the two
5 fluids and the etchant fluid and a second fluid interface exists between the two fluids.

1 27. (Currently amended) The method of claim 26 wherein the step of terminating
2 etching of the surface ~~contaminant-particle~~layer comprises passing the ~~workpiece-wafer~~
3 through the first fluid interface into one of the two fluids.

1 28. (Currently Amended) The method of claim 26 wherein the step of terminating
2 etching of the surface ~~contaminant-particle~~layer comprises drawing the ~~workpiece-wafer~~
3 through the first fluid interface to provide a rapid etch stop and further including the step
4 of passing the ~~workpiece-wafer~~ through the second fluid interface such that a protective
5 coating is formed on a surface of the ~~workpiece~~wafer.

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1 29. (canceled)

1 30. (canceled)